IX. A NORTH AMERICAN OLIGOCENE EDENTATE.

By George Gaylord Simpson.

(Plate XXIV).

Introduction.

In 1905[1] Earl Douglass described a small skull from the lower Oligocene of Montana, under the appropriate name of *Xenotherium unicum*[2]. Although he expressed a certain proper hesitation, Douglass concluded that the animal was a Monotreme. "In fact," he said, "with the exception of the presence of tympanic bullæ and rooted teeth, it [the skull] differs in no essential particular from *Ornithorhynchus* or *Echidna*." The only positive comparison drawn, however, was to point out that the pterygoids may have tended to arch over the choanæ and move them backward. He concluded, "If this is the skull of a Monotreme it certainly is of great interest. If not, it is perhaps even more so; as, so far as I can learn, there is nothing like it among the Eutheria."

In 1906 W. D. Matthew referred to "*Xenotherium*" and expressed his belief that it was a chrysochlorid, perhaps identical with *Apternodus*, then known only from lower jaw fragments, and possibly also with an animal known from a humerus, later named *Arctoryctes*.* At least the first of these suggestions was shown to be incorrect by the same authority in 1910, when he described a nearly complete skull and jaws of *Apternodus*, and showed that the skull was very unlike that of *Epoicotherium* (although not specifically making this comparison). He still regarded *Epoicotherium* as a zalambdodont, however.

W. K. Gregory (1910) accepted Dr. Matthew's view, stating (p. 258) that the skull of "*Xenotherium*" (*Epoicotherium*) resembles that of *Chrysochloris aurea* in general appearance, in the hemispherical form of the bullæ, form of the snout, zygomatic arch, lateral occipital crest

[1] All references are to be found in the appended bibliography.

[2] *Xenotherium* proves to have been preöccupied and is here replaced by *Epoicotherium*.

*Science, N. S., XXIV, 1906, p. 786; Bull. A. M. N. H. XXIII, p. 172.

on squamosal, etc. and essentially differs only in having the alveoli of the cheek-teeth circular rather than triangular.

The view of Matthew and Gregory has been widely accepted, thus by Abel (1919, p. 728), by Schlosser (1923, p. 444) and by several others. Winge (1917, p. 193), however, has raised objections which, being brief and not readily accessible to students unfamiliar with Danish, may be translated in full:

"*Xenotherium* was defined by Douglass on the basis of a skull without lower jaws and almost without teeth, but with alveoli. The discovery was also referred to by Matthew and by Gregory. Douglass referred the form to the Monotremes, while Matthew and Gregory place it in the Chrysochloridae, or at least in the vicinity of *Chrysochloris*, and they are followed by Schlosser. True enough, the skull has at a passing glance a striking likeness to *Chrysochloris*: the short, broad, compressed brain-case; the broad interspace between the orbits occupied by the mesethmoid; the shovel-like snout with lateral extensions; but the resemblances are merely an expression of the fact that *Xenotherium*, like *Chrysochloris*, was a fossorial animal. They are attributes which are also seen more or less clearly in widely different mammals, among marsupials, insectivores, edentates, rodents.

"In other respects *Xenotherium* is as different from *Chrysochloris* as is well possible; incisors are entirely lacking; only vestiges of six small peg-like teeth are found on each side, with single styliform roots, all placed in a closed series, the anterior of them, perhaps the canine, somewhat stronger than the others; the palate is hollowed out and channel-like; the outer wall of the infra-orbital canal is broad; the zygoma is strong anteriorly and weak posteriorly, the opposite of the condition in *Chrysochloris*; etc.—Where *Xenotherium* belongs is now undecided, but it is certain that it neither pertains to the Monotremata nor is a relative of *Chrysochloris*."

In a very recent paper, Otto Zdansky (1926) has considered this question in more detail than anyone since Douglass' original description. He also dismisses the reference to the Monotremata, and he considers identity with *Apternodus* improbable[3]. Like Winge[4], Zdansky believes the resemblance to *Chrysochloris* to be explicable on the basis of convergence due to similarity of habits, and he points

[3] Apparently overlooking the fact that Matthew himself described the quite different skull of *Apternodus* in 1910.

[4] To whose paper he does not refer.

out that except for the form of the snout, the fossil genus resembles the marsupial *Notoryctes* about as closely as it does the placental *Chrysochloris*. Although, unfortunately, the original has not been studied by him, Zdansky reaches the very suggestive conclusion that "*Xenotherium*" (*Epoicotherium*) was an edentate of some sort, basing himself on the character of the teeth and alveoli as described by Douglass.

In connection with a research on the evolution of the zalambdodonts, especially with reference to the molar teeth, now in progress, it seemed important to the present writer to restudy this extraordinary fossil. The unique original was lent to the Peabody Museum for this purpose by the authorities of the Carnegie Museum in the most liberal fashion and their kindness is gratefully acknowledged.

Order **EDENTATA.**

Suborder *XENARTHRA.*

Family EPOICOTHERIIDÆ, *nov.*

A family based on the single genus *Epoicotherium*. Small subterranean edentates, with depressed snout, domed occiput, slender but complete zygomata without sub- or post-orbital processes, large completely ossified tympanic bullæ, with which are ankylosed the pterygoid plates, there being no hamular processes, and cylindrical, one-rooted cheek-teeth without enamel.

Some of the characters of this provisional definition may not prove to be of true familial rank, when the group is better known, but for the present they will serve to distinguish *Epoicotherium* from all other known mammals and to show that this distinction is of more than generic significance.

Epoicotherium,[5] Gen. nov.

Genotype: *Epoicotherium* (*Xenotherium*) *unicum* (Douglass).

Genoholotype: Carnegie Museum 1018. Skull without lower jaws.

Locality: "McCarty's Mountain," Madison County, western Montana (Douglass).

[5] ἐποικος = a sojourner in a strange land, and θηριον, beast. Unfortunately the term *Xenotherium* Douglass 1906, by which this mammal has hitherto been known, proves to be preöccupied by *Xenotherium* Ameghino, 1904, a genus of noto-ungulates (An. Soc. Argent., Buenos Aires, 1904). *Epoicotherium* has like meaning.

Horizon: "Titanotherium beds," lower Oligocene.

Distinctive Characters: Cheek-teeth six, the first larger than the rest and semiprocumbent.

Many of the other known characters are no doubt of generic value, but the above are quite sufficient to validate the genus, since no other members of the family are yet known.

Skull: The general features of the skull were carefully described by Douglass and the points emphasized by him need be only briefly mentioned. In general aspect the skull is, indeed, very much like that of *Chrysochloris*, as stressed by Matthew and Gregory; rather less, but still quite notably like that of *Notoryctes*, as pointed out by Zdansky; and also very much like that of *Chlamyphorus*,[6] a fact which seems to have escaped notice. In size it is comparable to a small *Chlamyphorus* or a large *Chrysochloris* and is larger than *Notoryctes*. As in all of these genera the bones are all ankylosed; the zygomata are slender, but complete, not widely expanded; complete tympanic bullæ are present; the occiput is very large, dome-like, and wider than the zygomata, the lambdoid crests pass directly into the zygomata. It superficially differs in form from *Notoryctes*, chiefly in having a more depressed snout; from *Chlamyphorus* chiefly in the absence of suborbital processes on the zygomata, of frontal projections, and (so far as known) of the extraordinary peculiarity of the ear seen in that genus. From all three it differs, as will appear below, in many of the less adaptive, more deep-lying structural characters. Its convergence to *Chrysochloris* in general form is very striking, even extending to the development of lateral forward-jutting processes on the premaxillæ. The detailed structure, however, much of which can now be revealed, does not bear out the suggestion of affinity conveyed by the general aspect.

The various foramina, except those within the orbit or between the bullæ, now appear to be clearly distinguishable. On the occiput, slightly below the middle and just back of the occipital or lambdoid crest, are at least one and perhaps two small postmastoid foramina.

[6] *Chlamyphorus*, the *Pichiciego* or *Pichiciago*, is a very rare, small, burrowing armadillo, found chiefly in the vicinity of Mendoza, Argentina. The skull has been figured several times, but never, so far as the writer is aware, more satisfactorily than in the classic monograph by Hyrtl (1855), although even here some of the more minute details are difficult to make out. It is generally, but incorrectly, called "*Chlamydophorus*."

These have served to weaken the skull and form loci for cracks during crushing, so that they are not perfectly clear; but the presence of at least one on each side is quite certain. They seem to indicate a significant occipital exposure of the mastoid and are absent in Chrysochlorids and Notoryctids, but present in Xenarthra. There are also, as in many mammals, two very small and asymmetrically placed vascular foramina near the top of the supra-occipital. A small but well-pronounced pit occurs just above each condyle, but no true foramina are seen here. On the base of the skull and immediately anterior to the largest part of each condyle is a deep pit, into which the condylar foramen apparently opened posteriorly and the posterior lacerate foramen anteriorly. Just external to this pit and somewhat posterior to the bullæ on each side is a very small foramen, which possibly corresponds to the venous condylar foramen. Anterior to the posterior lacerate foramina and at the posterior edge of each bulla is a very small pit or foramen. The region antero-external to this on the right side is crushed and uncertain, but on the left side immediately antero-external to it is a larger rounded pit, with an entire bottom, and then a foramen of moderate size. The latter is the stylo-mastoid foramen, and the development of this region in general seems to be very closely similar to that of *Dasypus*. As in the latter genus, it is apparent that the hyoid attachment has been moved postero-internally from its primitive position near the stylo-mastoid foramen (*cf.* v. Kampen, 1905). There are no distinct paroccipital, post-tympanic, or post-glenoid processes, such of these as existed in the ancestry having merged with the expanding bulla. The basicranial portion of the skull is large in proportion to the basifacial portion, agreeing in a general way with *Notoryctes* and *Chrysochloris*, but contrasting more or less with the dasypods, including *Chlamyphorus*. Like a number of other characters of *Epoicotherium* this is unquestionably due to the great areal extent of the bullæ. Despite their quite extensive development, however, the latter are not greatly inflated. They are triangular, with the somewhat oblique base of the triangle anterior and the apex at the posterior lacerate foramen. They seem to have appropriated most of the *basis cranii* in their growth and to have crowded other structures to a marginal position. Their antero-internal angles almost meet, hiding most of the basisphenoid, posteriorly they extend almost to the condyles, and anteriorly they have usurped the function usually performed by the post-glenoid

process and underhang the glenoid fossæ, essentially as in the dasypods with bullæ and somewhat as in *Chrysochloris*, *Notoryctes*, and some other bullate mammals. The composition of the bullæ cannot be made out, as the elements are fused; but there is little doubt in view of their spatial relationship that they involve to some extent the squamosal anteriorly and petrosal posteriorly, while the main part is formed from the tympanic.[7] There is a short, ossified external auditory meatus, opening just under the root of the zygoma, where it passes into the lambdoid crest, indeed the antero-inferior lip of the meatus extends out so as to be almost flush with the zygoma and to give the meatus the appearance of opening within the base of the latter (*cf.* some dasypods, as *Peltephilus* Scott, 1903) in a way quite distinct from the conditions in *Chrysochloris* or *Notoryctes*. The posterior lip, however, is less completely ossified. The glenoid surface is fairly large, nearly flat, but slightly concave antero-posteriorly, and underhung posteriorly, as already mentioned, by the bulla and external auditory meatus. The post-glenoid foramen is situated in a pocket above the latter and posterior to the middle of the glenoid surface, almost exactly as in *Dasypus*. At the anterior edge of the upper part of the bulla and on a level with the nearly horizontal alisphenoid plate, referred to below, is a small foramen, apparently for the eustachian tube. The median lacerate foramina are probably between the closely approximated anterior ends of the bullæ where they cannot be exposed. If so, the condition is like that seen in *Dasypus*, making allowance for the relatively larger bulla of the fossil form. On a level with this foramen and almost directly internal to it is one which pierces the vertical pterygoid plate, and which apparently finds its homologue in the almost closed notch, which is found in the same situation in at least some specimens of *Dasypus*, and perhaps in the notch above the hamular process of *Chrysochloris* and other mammals. It is on the same level as the eustachian foramen, with which it is united by a faintly indicated groove on the alisphenoid, and no doubt it gave entry for the eustachian tube into the pharynx, necessity for a foramen here arising from the

[7] There is some indication of a separate origin for the inner portion of each bulla, which may suggest the presence of a separate entotympanic (as in Xenarthra generally and some other mammals) or the participation of the basi- + alisphenoid as in *Chrysochloris*, but this is too uncertain to be of any value.

completion of the vertical pterygoid plate between the palate and the bulla. It may be called the pterygoid foramen.

Above the eustachian foramen, slightly below the glenoid fossa, and between them, is a large circular foramen, the *foramen ovale*, and slightly antero-internal to and below this is a smaller circular foramen, possibly the *foramen rotundum*, but more probably for a branch of the external carotid, these two being developed very much as in *Dasypus*, although somewhat more external and higher in position, corresponding in this respect with the one foramen here seen in *Chrysochloris*. The other foramina in this region cannot be made out with sufficient clarity to warrant description.

The vertical pterygoid plates do not become less prominent posteriorly or pass internally to the true tympanic bullæ, as in almost all other known mammals, but pass without diminution or interruption into the tympanic bullæ, with which they are fused, a remarkable condition, which could apparently readily be derived from that seen in the bullate dasypods. These plates almost touch posteriorly but are a little wider apart anteriorly where they pass into the palate. External to each of these is developed a narrow almost horizontal flange, presumably from the alisphenoid, very similar in character to that seen in *Chrysochloris*. In at least some species of *Dasypus* there is an essentially similar but less developed ledge on the alisphenoid, which could readily give rise to this condition with the areal expansion of the bullæ and extreme narrowing of the choanæ.

The palate is quite unlike that of *Chrysochloris*, but falls well within the dasypod morphological series. It is long and narrow, with nearly parallel sides, slightly arched longitudinally and ridged internal to each tooth row, but grooved in the median line. It extends considerably back of the last cheek-tooth and is not at all transversely ridged or elevated at the posterior end.

It is a noteworthy fact that the bending of the basifacial on the basicranial axis, so prominent in *Chrysochloris* and *Notoryctes*, is considerably less so in *Epoicotherium* (*Xenotherium*).

The roof of the skull is smooth, although not more so than in *Priodontes*, for example, so that the possibility of the presence of armor is not to be denied, although, even if once present, it would probably tend to be lost in a strictly subterranean form. A few vascular foramina and pits (the latter perhaps due to corrosion) are seen, but they are less numerous than in modern armadillos, and especially

the lateral parieto-squamosal groups, generally so prominent in the latter, are absent. There is, however, an irregular group of five or six small foramina between the widest part of the frontals, as in *Dasypus*.

The lachrymal rim is markedly elevated and there is a distinct lachrymal prominence. The lachrymal foramen is on this rim just below the prominence, much as in *Chrysochloris*, dasypods, and many other mammals.

There is an almost imperceptible postorbital protuberance on each frontal and here there is on each a very distinct round foramen. A foramen is found here in a number of mammals, but is peculiarly prominent and persistent in most Xenarthrans, while totally absent in *Chrysochloris* and its allies. As already noted by Douglass, the infraorbital foramen is double, the two openings being circular, of equal size, one above and a little in front of the other.

Dentition: The specimen ends anteriorly with the coming together of the longitudinal palatal ridges, the part anterior to this being broken off. It is impossible to say definitely that no incisors were present, but there is no evidence of them and space for their roots was apparently small, or lacking, so that they probably did not occur. In any event the first tooth of which the alveolus is preserved was preceded by a long diastema. There were six cheek-teeth (*Peltephilus* has six and one incisor, but they are differently disposed, *Tatusia* has seven or eight, as has also *Prozaëdius*; *Stegotherium* has five to seven; *Chlamyphorus* has eight). The first tooth is somewhat the largest, and it is semi-procumbent as, for example, in *Tatusia*. It appears to have been cylindrical and it had a single fang. The third tooth is somewhat larger than the second and the fourth and sixth are progressively a little smaller. The second to fifth alveoli are empty, but plainly lodged roots which were nearly round, only slightly tapering, and quite undivided. The last, on sixth alveolus, on each side still contains at least the roots of a tooth. They are, as inferred for the others, simply cylindrical. It is impossible surely to affirm the original nature of the blunt ends of these teeth, for they are clearly worn and perhaps broken also. They are composed of a dense material now black and somewhat shiny. The closest microscopic scrutiny fails to reveal any lack of homogeneity even on the worn or broken faces, so that this material is plainly dentine, and enamel is lacking, at least on the parts preserved. Such teeth are known only

among edentates (and in *Orycteropus*) and they compare very closely with those typical of the dasypods. The last tooth is followed by a slightly elevated point of bone, as in *Dasypus*.

RELATIONSHIPS.

The possibility of monotreme relationships for *Epoicotherium* may readily be dismissed. There is a resemblance in the general habitus of the skull, but none in the more important anatomical details. Nor is there any especial indication of marsupial affinities. The resemblance to *Chrysochloris*, on the contrary, is extraordinarily close and detailed. *Epoicotherium* exhibits hardly one habitus character (outside the dentition) which is not also found in the recent genus. These resemblances have already been referred to in this paper, and they were stressed by Matthew and by Gregory. As already claimed by Winge and Zdansky, however, they are mostly such as might be ascribed to similarity of habitus. Examined in more detail the two genera reveal very deep-lying differences: in *Epoicotherium* the basicranial-basifacial flexure is less sharp; the zygomata are different, most markedly in their relationship to the external auditory meatus; the occipital condyles are of different character; the bullæ are less inflated, of different shape, and occupy more of the basis cranii; there is no hamular process and the relation of the pterygoid plates and the bullæ is different; the palate is quite distinct in character; the various foramina exhibit a number of important differences; and finally, but perhaps most impelling of all, the teeth are altogether dissimilar in arrangement, number, and, especially, form.

The resemblance to *Dasypus* in structural detail is especially close.[8] The most striking superficial differences such as the greater depression of the snout and the expanded, dome-like occiput are seen also in the dasypod *Chlamyphorus* which has been abundantly shown to find its closest known ally in *Dasypus*.[9]

Chlamyphorus, although thus approaching *Epoicotherium* in habitus,

[8] *Dasypus* appears to be one of the most primitive of living edentates. The presence of a bulla is a specialization, but one which is carried even farther in the same direction in the fossil form so that it merely aids the comparison in a legitimate way.

[9] It was pointed out by Atkinson as long ago as 1871 that the skull of *Chlamyphorus* is very like that of *Chrysochloris*, except for the frontal tuberosities of the former.

however, does not thereby seem to suggest especial phylogenetic affinity. It is a very peculiar and highly aberrant derivative of an essentially *Dasypus*-like form. In a broad way, the relationship of *Epoicotherium* and *Chlamyphorus* may be thought of as similar to that of *Chrysochloris* and *Talpa*—they are ordinally related and convergent in habitus, but of distinct lineage.

Outside of these superficial characters paralleled in *Chlamyphorus*, the chief differences of *Epoicotherium* from the dasypod stock are those due to the areal expansion of the bullæ and the concomittant, or perhaps consequent, narrowing of the choanæ. Almost all the anatomical details of the fossil form compare favorably with those seen in Dasypoda, and a majority of the most striking differences from *Chrysochloris* are resemblances to the dasypods. There seems to be adequate basis for the conclusion that *Epoicotherium* is a derivative of the primitive xenarthran or pre-xenarthran stock and finds its closest living relatives in the armadillos.

The habitus of *Epoicotherium* is plainly fossorial, or indeed probably quite subterranean, like *Notoryctes*, *Chrysochloris*, and the true moles of today. Its close resemblance to these three types is quite inexplicable on any other basis. Such an habitat for an armadilloid derivative is not surprising, for, as is well known, the armadillos are among the most efficient of fossorial mammals. None of them is strictly subterranean in habitat,[10] but it would be quite in keeping with their evolutionary trend that a diminutive member of the group or of its ancestry should have become so. The armadilloid diet is adaptable to a subterranean life, as it includes roots, worms, grubs, insects, small animals, and carrion.

The sea, a resistant medium, molds the animals which move through it to a common form, as witness the classic convergence of fish, ichthyosaurs, and dolphins. The earth, by far the most resistant medium of all, is also strict in drawing its inhabitants to a common aspect, although the fact that it offers no incentive for speed gives a little latitude. *Notoryctes* and *Chrysochloris* are so much alike, that a gifted anatomist has urged their close relationship, but they are derived from quite different superterranean ancestors. *Chrysochloris*

[10] As would be expected, *Chlamyphorus* is most nearly so, being the most actively fossorial member of this generally fossorial group. It lives in a sandy terrain and spends a large percentage of its time underground, but emerges at night for food. (See White, 1880.)

and the true moles were long confused, but they, too, had distinct non-fossorial ancestors, although they are ordinally related. *Epoicotherium* and *Chlamyphorus* furnish a less striking, but nevertheless interesting, example of the same sort of convergence, while the monotremes, notoryctids, chrysochlorids, talpids, *Epoicotherium* and *Chlamyphorus* all show a uniformity in cranial topography truly remarkable in view of their very diverse affinities.

The possibility that the resemblance of *Epoicotherium* and *Chrysochloris* is not altogether due to convergence of unrelated stocks is to be borne in mind. The Xenarthra appear to have been derived from the Insectivora, and the retention in more or less degenerate and specialized humble creatures of devious mode of life of some exceedingly primitive characters is a common occurrence. To sum up, it seems that *Epoicotherium* shows evidence of remote common ancestry and of identical habitus with *Chrysochloris* and of immediate common ancestry with, however, a slightly different habitus from the Dasypoda as a whole.

This is the only record of the presence of an edentate in North America between the middle Eocene and the Pliocene. It has been supposed (see especially Matthew, 1918) that the recorded history started with the introduction into North America of the primitive edentate stock, seen in the tæniodonts and palæanodonts, the latter very close to the common ancestry of modern edentates; that this was followed by the introduction of the primitive stem-group into South America, and that land connection between the continents was then broken, the distinctive northern groups soon becoming extinct and the southern stock evolving in isolation into the modern groups of the Xenarthra, some of these groups reaching North America for the first time when land connection was reëstablished in the Pliocene. *Epoicotherium* necessitates some modification of this conception.

The following possibilities suggest themselves:

1. A land connection with South America was in existence in late Eocene or early Oligocene time and over it came *Epoicotherium* as a representative of a group developed in the southern continent.

2. The differentiation of the typical modern neotropical edentates took place earlier than generally supposed and while the two continents were still united, but *Epoicotherium* represents the only known member of these groups in North America before the Pliocene.

3. *Epoicotherium* is not a true dasypod, but an independent, perhaps somewhat parallel, offshoot of the pre-dasypod stock (probably

the Palæanodonta) and is the only known member of a distinct line which survived in North America after the other northern types of edentates had become extinct, so far as known.

Of these the first merits little consideration. *Epoicotherium* is not sufficiently close to any known South American xenarthran to postulate a special land bridge for it, in view of the fact that the existence of such a connection is opposed by a very strong body of detailed evidence. The second also seems improbable, for if the supposed South American groups were common to North and South America before these two were separated, it is very difficult to explain why the rich northern Paleocene and Eocene collections contain no members of these groups but include a considerable number of edentates of a different and more archaic stamp. The writer therefore very much prefers the third alternative, which agrees not only with the evidence derived from the temporal and spatial distribution of the edentates in general, but also with the morphological characters of *Epoicotherium* itself.

If this conclusion is a just one, it follows that the form under discussion is the representative of a new major division of the Edentata or of the Xenarthra, but until it is better known one prefers not to take such a step and for the present it is only referred to a distinctive family. Comparison with *Metacheiromys* is especially desirable, but has not been undertaken, the types of this genus being insufficient for comparison and subsequently discovered excellent skull material not having been adequately figured or described. *Epoicotherium* is not a palæanodont, however, unless the conception of that group be signally altered. It is very improbable that the canines were enameled, and, if present, they were but slightly enlarged and not followed by a diastema; the posterior lacerate foramen is not of primitive character, etc. The structure in general seems considerably less primitive, nor is it in line with the evolutionary trend of the known palæanodonts.

The Oligocene and Miocene edentates of Europe might offer some interesting contrasts were comparable remains at hand, but there is no reason to suspect close relationship.

The question which led to the present inquiry, that is, whether true chrysochlorids occur in America, is still unsettled. *Epoicotherium* is not a chrysochlorid, and the evidence is thus greatly weakened. *Necrolestes* resembles *Chrysochloris* chiefly in adaptive characters in the skull and fore-limb, but very significant differences are also seen

(the detailed structure of the less plastic parts of the skull is moreover inadequately known) and the pelvis and hind-limb are quite unlike those of the African form. Without accepting the suggestion of Leche (1907) and the dictum of Winge (1917) that *Necrolestes* is a marsupial, it seems possible that it, too, is a convergent form and not really a member of the *Chrysochloris* group, although apparently an insectivore and perhaps even a zalambdodont. *Apternodus* has been shown by Matthew not to be a chrysochlorid. *Arctoryctes*, a humerus briefly, described but not figured by Matthew, and by him definitely referred to the Chrysochloridæ, may belong there, but at present it seems at least possible that it pertains to some less exotic, small fossorial mammal, perhaps to *Epoicotherium* (*Xenotherium*). Without denying the possibility, it is clear that there is no unequivocal evidence of the existence of true chrysochlorids elsewhere than in Africa. The question proves, however, to be foreign to the subject of the present paper, and full discussion of it must be postponed.

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EXPLANATION OF PLATE XXIV.

FIG. 1. Left lateral view of skull of *Epoicotherium* (*Xenotherium*) *unicum* Douglass. Type. Natural size.

FIG. 2. Palatal view of *Epoicotherium* (*Xenotherium*) *unicum* Douglass.

FIG. 3. Dorsal view of same specimen.

The first three figures were drawn by Mr. Sydney Prentice from the type, Carn. Mus. Cat. Foss. Vert., No. 1018.

FIG. 4. *Epoicotherium unicum* (Douglass). Skull, from below. Magn. about 2 diam. B, tympanic bulla. CF, condylar foramen. Con, Condyle. EAM, external auditory meatus. EuF, arrow pointing to eustachian foramen. FM, foramen magnum. GS, glenoid surface. HA, articulation of hyoid arch with basicranium. IOF, infraorbital foramina. LC, inferior portion of lambdoid crest. PLF, posterior lacerate foramen. PGF, arrow pointing to postglenoid foramen. PMF, postmastoid foramen. PMP, premaxillary projection. PtF, bristle passing through pterygoid foramen. SMF, stylomastoid foramen. SOF, supraorbital foramen.

FIG. 5. *Epoicotherium unicum* (Douglass). Skull, from below. Magn. about 2 diam., from a photograph.